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Assessing the Local Economy-Wide Impacts of an Anchor Enterprise in Rural Malawi

Evidence from the 2025 operations of Pyxus Agriculture Malawi Limited around Chilanga Farm and Forest, Kasungu

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Executive summary

Smallholder-centered agricultural strategies have had limited success in Malawi, prompting interest in anchor-enterprise models in which agribusinesses partner with surrounding smallholder farmers. This note examines whether the benefits of one such anchor enterprise — Pyxus Agriculture Malawi Limited (PAM), a Growth Poles Project partner that sources groundnuts from smallholder farmers around its Chilanga Farm in Kasungu District — reach beyond the farmers and workers it engages directly. Using a local economy-wide impact evaluation (LEWIE) model calibrated on 2025 household and business survey data together with firm administrative records, we trace the full circuit of income that PAM's local spending sets in motion.

PAM's 2025 injection of MWK 623 million — MWK 165 million in net outgrower payments for groundnut sales and MWK 458 million in wages — generated an estimated MWK 1,152 million in real household income across the zone of influence (95% CI: 1,090–1,214), corresponding to a real income multiplier of 1.85. In other words, for every kwacha PAM spent locally, a further MWK 0.85 of real income was created as that spending circulated through local markets, amounting to MWK 529 million in secondary or spillover income. Roughly 74 percent of this spillover accrued to households with no direct contractual relationship with the enterprise, reaching them through the wages and profits of local businesses that serve the PAM workforce and outgrowers. The poorest 40 percent of households captured about 34 percent of the secondary income (MWK 178 million). PAM's operations and spending also supported approximately 6,780 additional labor days beyond direct employment at Chilanga Farm. These gains came with only moderate price pressure: PAM's operations raise non-tradable prices by approximately 7.4 percent and local wages by 4.6 percent.

The multiplier is large and statistically robust, falling to 1.62 only under the most conservative assumption — treating all local activities as non-tradable — and otherwise close to the central estimate of 1.85. Its comparatively high level reflects the specific conditions of the zone of influence around Chilanga Farm and forest: high local retention of household spending, a high value-added share in groundnut production that channels outgrower payments directly into household income rather than into purchased inputs, and strong circulation of income through nearby village and trading-center markets. The principal brake on the multiplier is leakage through non-farm intermediate inputs, as local businesses source between 51 and 70 percent of their inputs from outside the zone.

Ex-ante simulations map the levers available to PAM and its partners to amplify its local economic impact further. Of the five scenarios modeled, a seed-multiplication ("nursery") package that lowers outgrower input costs and local sourcing of a workforce meal program — generate the most total income relative to the direct injection (MWK 117.6 million total from MWK 63.5 million and MWK 28.2 million from MWK 15.2 million, respectively). The wage channel yields somewhat less total income relative to the direct injection (MWK 193.3 million total from MWK 114.4 million) but distributes it more broadly, with non-PAM households capturing nearly half of the spillover income. A complementary 10 percent productivity improvement in local non-tradable businesses would raise the overall multiplier from 1.85 to 2.04 while substantially reducing the associated price pressure (from 7.4 to 4.3 percent), underscoring that investments in local market infrastructure, business capacity, and supply-chain logistics could simultaneously amplify income gains and reduce leakage.

Introduction

Smallholder-centered agricultural development strategies have had limited success in Malawi over the past several decades. Land constraints and rising population pressure cast doubt on whether productivity gains among farmers alone can deliver sufficient income growth to lift farming households out of poverty (Benson and De Weerdt, 2023). Policy makers are now increasingly looking for alternative ways to accelerate agricultural and rural development. One emerging approach involves larger farms or agri-business firms partnering with smallholder farming households, in what we refer to as an anchor enterprise model. Under this model, smallholders contribute land and/or labor to produce crops or livestock products that serve as inputs for, or are marketed jointly with, the anchor enterprise. In return, the anchor enterprise provides support such as technical assistance, inputs (often on credit), transport, or storage. This partnership is intended to be commercial and mutually beneficial.

While support for such partnerships is growing and the anchor enterprise model is increasingly being used in development programming in Malawi, there is still little rigorous evaluation of its effectiveness. A key question is whether and how such anchor enterprise models can contribute to inclusive development. Previous research highlights that anchor enterprise models cannot be profitably and sustainably employed for many types of commercial agricultural production in Malawi. Consequently, only a small portion of farming households can directly participate, and the poorest and most vulnerable are generally less likely to be included (Benson, Cockx, and De Weerdt, 2025). Nonetheless, where such models work well, they can deliver indirect benefits to the broader rural community, including its poorer and more vulnerable members, by stimulating local demand for labor, goods, and services.

This is part of the rationale for the Malawi Growth Poles Project, supported by the Embassy of Ireland[1], which works with well-established large enterprises to integrate smallholder farmers and other rural households more strongly into agricultural value chains with high growth potential. The Growth Pole approach rests on the premise that a strengthened anchor enterprise can act as an engine of sustainable, resilient, and inclusive economic growth, with effects that extend well beyond the farmers and workers it engages directly. Its explicit goal is therefore not only to create a pool of direct beneficiaries — through smallholder supply partnerships and employment in the enterprises' production and processing operations — but also to generate indirect benefits, both upstream and downstream, within nearby communities by stimulating local demand for labor, goods and services.

This basic premise — that an anchor enterprise's purchases of local labor and agricultural products will generate income and employment beyond the direct wages and payments for the crops or livestock products themselves — is theoretically sound, rooted in the linkages literature that runs from Hirschman (1958) through Mellor (1976) to the modern computable general-equilibrium tradition. These expenditures create income for workers, farmers, and local businesses, which is then re-spent within the local economy, generating additional rounds of economic activity and employment. Conventional impact evaluations measure only direct effects and typically concentrate on the impacts on participating farmers' incomes. Much less attention has been given to the indirect and induced effects that arise when these incomes circulate through local markets and supply chains. What has been missing is not simply an estimate of multiplier size, but a general-equilibrium accounting of the full circuit of income that a growth pole sets in motion. As a result, there is still limited evidence on the extent to which anchor enterprises contribute to wider income growth, employment creation, and poverty reduction in the communities where they operate.

This study aims to address that gap by examining the local economy-wide impacts of the operations of Pyxus Agriculture Malawi Limited (PAM) on and around its Chilanga Farm in Kasungu District. PAM, one of the Growth Poles Project's partners, is a subsidiary of Pyxus International, Inc., a global agribusiness with a long presence in Malawi through its tobacco subsidiary, Alliance One Tobacco Malawi (AOTM). PAM is replicating AOTM's Integrated Production System (IPS) model to build a traceable and certified groundnut value chain, drawing on many of the operational components and field staff of the tobacco IPS. Since 2019, it has sourced groundnuts from a large network of smallholder farmers across the northern and central regions of Malawi — most of whom are also contracted to AOTM for tobacco — providing them with improved seed and other inputs on credit, extension services, and a guaranteed market. PAM also operates its own large farms, which serve as grading and buying centers for groundnut. In addition, the company runs a large forestry operation, producing timber and fuelwood largely to supply sustainable and traceable wood products including curing wood for the tobacco business.

This evaluation focuses on the local economy around PAM's Chilanga Farm in Suza, a Sub-Traditional Authority under Traditional Authority Kaomba in Kasungu District. Employment at the site varies seasonally but together the farm, buying centers, logistics and forestry departments employ between 300 and 500 people. Within a 20-kilometer radius of the farm, PAM also works with approximately 300 IPS groundnut outgrowers. In 2025, PAM injected an estimated MWK 623 million into this local economy, comprising MWK 165 million in groundnut purchases from outgrowers (net of input credit) and MWK

[1] The United States Agency for International Development (USAID) initially provided 80 percent of the funding for the Growth Poles Project, scaling up an earlier USAID-funded project, the Agricultural Diversification (AgDiv) activity. However, in early 2025, USAID's financial support was canceled for reasons unrelated to the project.

458 million in wages. These expenditures represent the initial income injection generated by the enterprise, from which broader income and employment effects arise through local economic linkages.

To measure PAM's economic footprint around Chilanga Farm, the study applies the Local Economy-Wide Impact Evaluation (LEWIE) methodology developed by Taylor and Filipski (2014). LEWIE combines household and local business survey data on production, consumption, and market linkages in a local general-equilibrium model that simulates how income circulates through a geographically defined local economy, or zone of influence (ZOI). The ZOI is treated as a small open economy in which tradable goods, such as agricultural products, face prices set in wider regional and national markets, while the prices of non-tradables, such as local services, are determined by supply and demand within the ZOI itself. As Taylor and Filipski (2014) argue, general-equilibrium simulation is the appropriate tool for this kind of structural evaluation of interventions whose effects extend beyond direct beneficiaries, in this case those directly employed by or working with the enterprise. The LEWIE methodology has been applied in prior analyses of cash transfer programs in Malawi and Ghana (Filipski and Taylor, 2012), refugee inflows in East Africa (Taylor et al., 2016), and agricultural value-chain investments in Africa and Latin America (e.g., Daidone et al., 2023).

For this study, a LEWIE model was constructed for the local economy surrounding Chilanga Farm, defined as the area within a 20-kilometer radius of the farm.[2] The model is parameterized using primary survey data collected from households and businesses within the ZOI and is used to estimate the local economy-wide impacts of PAM's expenditures on wages and purchases of groundnuts. In addition to estimating the effects of observed spending in 2025, the model is used to simulate how realistic changes in enterprise expenditures or additional interventions might affect the local economy.

The report is organized as follows. Section 2 describes the theoretical pathways through which an anchor enterprise's spending affects local economies and frames our empirical strategy. Section 3 presents the survey design and summary statistics. Section 4 describes the LEWIE model, its parameterization from survey data, and the simulation design. Section 5 reports the main simulation results, including the ex-post multiplier for observed 2025 spending, the distribution of the resulting gains, and five ex-ante simulations of alternative scenarios. Section 6 presents the sensitivity analysis. Section 7 draws policy implications and concludes.

How anchor enterprise spending affects local economies

As mentioned above, the anchor enterprise model assumes that the presence of an anchor enterprise can influence local economies through a network of production and consumption linkages (Hirschman, 1958). For firms such as PAM, these linkages arise through contract farming arrangements with outgrowers, employment at company farms and forest plantations, and purchases of goods and services from nearby businesses. Although the first-round effects of such operations are straightforward, the broader economic impacts depend on how this income circulates within the local economy and on the extent to which local markets can respond without relying heavily on imports from outside the ZOI.

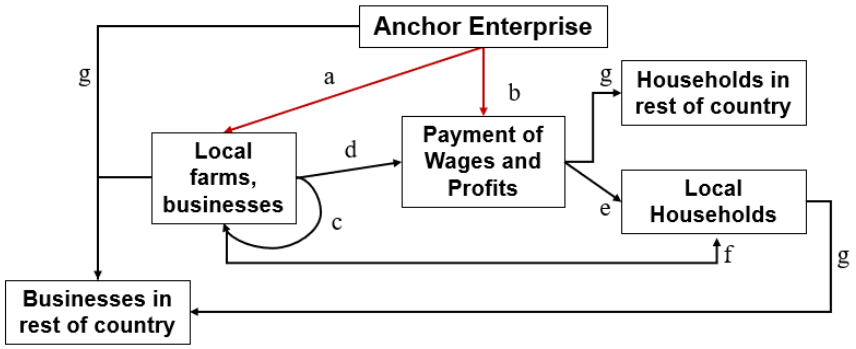
When an anchor enterprise such as PAM injects income into a rural economy, primarily through payments for groundnut purchases from contracted farmers and wages to workers, that income does not remain with those who receive it directly. It is re-spent — at local retailers and service providers, and on goods supplied by other farms and businesses — and each round of expenditure generates income for

[2] Specifically, the ZOI encompasses Kasungu Boma and the TAs Kaphaizi, Mangwazu, and Mwase, and parts of the TAs and STAs of Kaomba, Mawawa, and Mphomwa, and Wimbe.

others, who in turn spend a portion of it locally. The total income generated per unit of PAM's spending — the local income multiplier — depends not on the size of the injections alone, but on how this income circulates within the local economy and on the extent to which local markets can respond without relying heavily on imports from outside the ZOI.

The mechanisms through which anchor-enterprise income injections propagate through the local economy are illustrated in Figure 1, with direct impacts in red and indirect impacts in black.

Figure 1. Pathways from anchor enterprise spending to local economic impacts



Note: Red arrows denote the anchor enterprise's direct linkages (channels a and b); black arrows denote the subsequent circular flow through local markets (c-f) and leakages outside the local economy (g).

The direct pathways (a and b) are the firm's own expenditures. For PAM, this takes the form of groundnut purchases from contracted outgrowers, together with some limited procurement of construction materials and mechanical spares from local suppliers[3] (channel a), and wage payments (channel b). Wages are the dominant channel for PAM, accounting for MWK 458 million — roughly 73 percent — of the 2025 injection.

The indirect channels (c–f) trace the recirculation of this income earned by PAM workers and groundnut outgrowers within the local economy as they spend their income buying goods and services. Local farms and businesses purchase inputs from one another (c) and earn revenues, which in turn pay wages, and generate profits (d). These accrue to households across the ZOI — including those with no direct relationship with PAM (e) — which spend a further portion locally (f). This is where the income effect becomes tangible at the household level: the shopkeeper who sells roof sheets to a groundnut outgrower earns a margin, which in turn allows him to pay worker wages; the trader selling soap to Chilanga workers at the weekly market in Suza earns a profit and uses that to buy eggs from a local farmer. All these earnings are local income attributable to PAM's initial injections.

These effects are bounded by leakage (g): at each round, part of the income exits the ZOI through formal savings, remittances, or the purchase of goods sourced from outside the local economy. The size of the multiplier thus reflects the balance between locally retained spending and leakage; a high local expenditure share and low leakage yield a high multiplier. In contrast, if outgrowers and workers were to save all their money or spend it all outside the local economy, there would be no indirect effects and the total income generated in the local economy would be exactly equal to PAM's local spending resulting in a multiplier of one.

[3] While in the past, PAM had significant expenditures on goods and services from local businesses including, for example, local procurement of welded products, construction services, the company reports minimal purchases from local suppliers in 2025 as some production was moved in-house and other products and services were sourced outside the local economy.

Finally, these channels do not operate in isolation but interact through the price system. As PAM's spending raises demand for local labor and for non-tradable goods and services, local wages and prices adjust upward, increasing production costs and the cost of living. The net effect on real incomes therefore depends on the relative strength of these quantity and price responses.

The LEWIE approach formalizes these mechanisms by embedding local household and business behavior into a micro general-equilibrium framework. Households allocate expenditures across goods and services based on estimated marginal budget shares, distinguishing between items purchased locally and those obtained outside the ZOI. Businesses convert intermediate inputs, labor, and value added into output using production parameters derived from survey data. The relative shares of imported intermediates, local labor, and local inputs are especially important for determining the magnitude of spillovers. For example, high intermediate input shares in retail and service activities reflect dependence on goods sourced outside the ZOI. These represent structural leakages that limit the local multiplier even when final sales occur locally.

Data and summary statistics

The analysis primarily draws on data from a survey fielded in July 2025 aimed at characterizing households and businesses within PAM's zone of influence and estimating the behavioral parameters required for the LEWIE model.

The fieldwork was purposely conducted shortly after the main harvesting period to ensure that agricultural production and income are well-captured. Consumption in rural Malawi is, however, highly seasonal. Because the food expenditure module used a 30-day recall period, reported food expenditures reflect conditions of relative post-harvest abundance rather than the leaner months later in the year. Annualized household consumption and expenditure estimates derived from these data are therefore likely to be biased upward. Salience and recall effects may also affect information derived from questions referring to longer periods (i.e. non-food expenditures) or a typical month (i.e. non-farm businesses).

Household survey

The household survey was designed to capture economic linkages associated with PAM. The survey targeted three groups: i) PAM Integrated Production System (IPS) outgrowers supplying PAM with groundnuts[4], ii) workers of PAM's Chilanga Farm and logistics and forest departments, iii) households without direct contractual or employment relationships with PAM, which may nonetheless be affected indirectly through local market linkages. This stratification is essential for the LEWIE model, as each group has distinct income sources, expenditure patterns, and productive activities that determine how PAM-generated income circulates through the ZOI.

A total of 717 households were interviewed across three groups in communities around Chilanga Farm and forest in Kasungu District. The analytical sample used for all parameter estimation consists of 655 households: 191 outgrowers, 214 workers, and 250 non-linked households. Fifty-nine households of contracted outgrowers reporting no groundnut sales to PAM and no harvested groundnuts intended for sale are excluded from the analysis. The analysis further excluded three households with missing data.

[4] While PAM also engages in spot-buying of groundnuts from non-contracted farmers, the analysis concentrates only on IPS outgrowers producing groundnuts under contract. The spot-buying transaction records do not allow for reliable identification of the sellers and their location.

Sampling weights were constructed using national population estimates (NSO, 2019) to ensure that results are representative of the ZOI population. The stratified survey design oversampled linked groups to ensure precision in outgrower and worker expenditure parameters. As a result, non-linked households carry much higher individual weights because they constitute the large majority of the ZOI population (see Table 1). Additional details on the construction and application of sampling weights are provided in the Technical Appendix.

Table 1. Analytical sample and weights

Household group	N	Share of sample (%)	Average weight	Weighted N
Outgrower	191	29.2	1.27	243
Worker	214	32.7	1.98	424
Non-PAM	250	38.2	155.84	38,960
Total	**655**	**100.0**	**—**	**39,627**

Note: Share of sample calculated on unweighted counts. Average weight reflects post-stratification. Non-PAM households were sampled from two strata: villages where groundnut outgrowers reside and local trading centers. Trading center households (80 of 250) are overrepresented relative to their share of the ZOI population and tend to have higher and more market-oriented expenditures than village households. While the sampling weights partially correct for this, readers should bear it in mind when interpreting non-PAM household averages.

Table 2 summarizes key household characteristics by group. Outgrower households are typically larger (6.3 members) and headed by older adults (average age 50 years), reflecting established farming families. Worker households are notably smaller (4.4 members) and younger (average head age 38 years). Non-PAM households occupy an intermediate position in terms of size, age, and female head representation.

Table 2. Socio-demographic and economic characteristics by household group

Variable	Worker (214)	Outgrower (191)	Non-PAM (250)
Household size	4.4 (0.1)	6.3 (0.1)	4.9 (0.2)
Female-headed household (%)	25 (3)	12 (2)	22 (3)
Head age (years)	37.6 (0.8)	49.9 (0.9)	43.2 (1.2)
Head without formal education (%)	8 (2)	5 (2)	11 (2)
Own home (%)	32 (3)	86 (2)	90 (2)
Electricity (%)	15 (2)	39 (4)	22 (3)
Improved water source (%)	95 (1)	90 (2)	84 (3)
Cultivated land (hectares)	0.5 (0.0)	3.2 (0.2)	1.3 (0.1)

Note: Weighted means and robust standard errors in parentheses.

While home ownership rates are very high among the other household groups, less than one in three worker households own the dwelling they occupy. The majority reside in housing provided by PAM at Chilanga. Likely reflecting the difference in their location of residence, with outgrowers living in more

remote areas, worker households are more likely to have access to an improved source of drinking water.[5] Access to electricity, typically from other sources than the national grid, is, however, higher among outgrower households.

The average area cultivated by PAM IPS groundnut outgrower households is over 3 hectares, far exceeding that of other households in the area. Only about three out of five worker households engage in crop cultivation at all and when they do, they typically also farm smaller pieces of land, resulting in average cultivated area of less than half a hectare. Overall, all three groups of these households rely on a mix of crop sales, casual labor (*ganyu*), non-farm activities, and transfers, reflecting the diversified livelihood strategies common in Malawian smallholder settings.

Table 3 compares monthly food expenditures[6] and budget shares across worker, outgrower, and non-linked households. Panel A shows that outgrower households have substantially higher total monthly food expenditures, averaging MWK 140,975, nearly double those of Chilanga Farm and forest workers (MWK 75,525) and well above non-linked households (MWK 86,728). This difference is driven primarily by much higher spending on protein-rich foods—including meat, eggs, milk, and legumes—where outgrowers allocate approximately MWK 54,954 per month, more than three times the level observed among workers and roughly double that of non-linked households. Outgrowers also spend more on oils and sugar and fruits and vegetables. In contrast, worker households exhibit the lowest spending across most categories, particularly for protein-rich foods and oils and sugar, consistent with their lowest total food expenditures. This is particularly striking given that workers are also much less likely to cultivate land or keep livestock and hence consume food from own production, which is not included in the expenditures summarized below.

Panel B highlights differences in expenditure composition. Worker households allocate the largest share of their food budgets to staples (47.3 %), while outgrowers devote a much smaller share to staples (18.7 %) and substantially larger shares to protein-rich foods—meat, eggs, milk, and legumes (37.2 %)—as well as oils and sugar (19.9 %). Other households in the ZOI fall between these groups, with a more balanced distribution across staples (28.2 %), protein-rich foods (30.5 %), and oils and sugar (17.7 %). Fruits and vegetables account for roughly 15–17 percent of spending across all three groups, while prepared food and food away from home and alcohol represent relatively small shares. Overall, the results clearly show that outgrowers have both higher total food expenditures and more diversified spending, whereas workers spend more heavily on staples and less on higher-value food categories such as meat, dairy, and eggs.

Table 3. Monthly food expenditures and budget shares by household group

Panel A: Monthly food expenditure (MWK)			
Food group	**Worker (214)**	**Outgrower (191)**	**Non-PAM (250)**
Staples	37,586 (2,115)	39,025 (6,039)	31,564 (6,745)
Protein-rich foods	16,259 (1,868)	54,954 (5,091)	27,130 (2,562)
Fruits and vegetables	10,608 (579)	13,712 (1,178)	9,247 (700)
Oils and sugar	7,258 (589)	23,838 (1,639)	13,653 (1,469)

[5] A drinking water source is considered improved when it is protected from outside contamination, particularly fecal contamination.

[6] This refers to expenditures on purchased foods and does not include the value of consumption of own produced foods.

Condiments and beverages	1,328 (183)	3,027 (418)	1,942 (366)
Prepared food / FAFH	2,327 (429)	4,865 (585)	2,046 (309)
Alcohol	159 (64)	1,555 (508)	1,146 (309)
Total	75,525 (3,432)	140,975 (10,439)	86,728 (8,003)
Total per capita	20,008 (1,051)	24,849 (2,287)	20,022 (1,645)
Panel B. Budget shares of monthly food expenditure			
Food group	**Worker (211)**	**Outgrower (190)**	**Non-PAM (247)**
Staples	47.3 (1.8)	18.7 (1.7)	28.2 (2.2)
Protein-rich foods	19.5 (1.2)	37.2 (1.5)	30.5 (1.6)
Fruits and vegetables	16.6 (1.0)	15.2 (1.3)	15.0 (1.3)
Oils and sugar	10.6 (0.8)	19.9 (1.1)	17.7 (1.3)
Condiments and beverages	2.0 (0.2)	3.7 (0.6)	3.8 (0.8)
Prepared food / FAFH	3.6 (0.7)	4.2 (0.6)	3.3 (0.7)
Alcohol	0.3 (0.1)	1.1 (0.3)	1.6 (0.4)

Note: Food values are monthly expenditures in MWK. Budget shares are category expenditure divided by total monthly food expenditure. Shares are undefined for households with zero total food spending. Standard errors are robust and shown in parentheses. Means are calculated using household population weights.

Table 4 reports annual non-food expenditures and budget shares for the three groups. Panel A shows that outgrowers have substantially higher total non-food expenditures, averaging MWK 3.9 million annually, more than four times the level observed among worker households (MWK 0.9 million) and nearly three times that of non-linked households (MWK 1.4 million). This does not reflect differences in household sizes. Worker households also have the lowest total annual per capita non-food expenditure (MWK 240,607 per household member).

The largest absolute differences arise in housing, utilities, and home maintenance, where outgrowers spend approximately MWK 1 million annually, followed by education and domestic services (MWK 0.8 million), entertainment and travel (MWK 0.5 million), and clothing and personal goods (MWK 0.4 million).[7] These patterns suggest that higher incomes among outgrowers translate into greater investment in housing quality, education, and discretionary expenditures. Workers exhibit substantially lower spending across most non-food categories, particularly transport, education, and housing maintenance or repairs, even though more of them rent their homes. Non-linked households fall between the two groups but remain much closer to workers than to outgrowers in total non-food spending.

Panel B shows that although outgrowers spend more in absolute terms, the composition of non-food expenditures is broadly similar across groups, with a few notable differences. Housing-related expenses account for roughly 13–15 percent of total non-food budgets across all households, while milling/processing and entertainment/travel also represent sizable shares. Workers allocate a particularly large share to personal care and appearance (24.5 %), compared with 15.4 percent for outgrowers and 20.9 percent for non-linked households. In contrast, outgrower households devote larger shares to education and domestic services (11.6 percent versus 3.9 percent for workers), as well as transport and clothing. Non-linked households allocate relatively higher shares to entertainment and travel (15.1 %)

[7] Domestic or household services refers to expenditures on services including cleaning, laundry, childcare, hired help, etc.

and milling or other processing (13.3 %). Overall, the results indicate that outgrower households not only spend substantially more on non-food goods and services but also allocate relatively more resources toward housing quality, education, and mobility-related expenditures, while workers devote a larger share of limited budgets to personal consumption items.

Table 4. Annual non-food expenditures and budget shares by household group

Panel A. Annual non-food expenditure (MWK)			
Non-food group	**Worker (214)**	**Outgrower (191)**	**Non-PAM (250)**
Energy and lighting	75,412 (11,286)	194,483 (47,787)	103,296 (29,740)
Housing, utilities and home maintenance	187,815 (36,194)	1,001,977 (214,989)	324,340 (61,944)
Transport and vehicle costs	6,888 (5,193)	163,249 (32,372)	39,655 (18,082)
Communications and charging	57,379 (5,727)	127,738 (12,949)	68,139 (7,352)
Personal care and appearance	151,171 (8,303)	268,080 (16,840)	206,562 (17,707)
Health care	56,128 (6,589)	103,415 (14,161)	37,148 (5,421)
Clothing and personal goods	82,578 (9,694)	421,259 (62,610)	162,377 (29,317)
Education and domestic services	48,023 (12,177)	758,417 (164,606)	69,689 (15,485)
Ceremonies	5,350 (928)	25,547 (6,110)	12,264 (3,612)
Tobacco / gambling	594 (387)	38,942 (25,672)	1,160 (493)
Entertainment / travel	130,036 (18,536)	514,653 (155,443)	247,016 (31,845)
Milling / processing	73,357 (4,874)	153,182 (7,788)	104,455 (5,526)
Other non-food (donations and legal fees)	28,826 (6,755)	120,409 (26,454)	39,581 (6,266)
Total non-food expenditure	903,555 (66,840)	3,891,353 (459,071)	1,415,681 (126,083)
Total non-food expenditure per capita	240,607 (19,594)	627,733 (73,751)	329,977 (32,916)
Panel B. Budget shares of annual non-food expenditure			
Non-food group	**Worker (214)**	**Outgrower (191)**	**Non-PAM (250)**
Energy and lighting	7.8 (0.8)	4.9 (0.7)	6.9 (1.0)
Housing, utilities and home maintenance	13.0 (1.1)	14.9 (1.3)	14.2 (1.4)
Transport and vehicle costs	0.3 (0.2)	2.5 (0.5)	1.4 (0.5)
Communications and charging	7.8 (0.6)	6.5 (0.6)	5.9 (0.5)
Personal care and appearance	24.5 (1.1)	15.4 (1.0)	20.9 (1.1)
Health care	6.1 (0.7)	4.2 (0.6)	3.4 (0.5)
Clothing and personal goods	9.4 (0.9)	10.4 (0.9)	9.6 (1.0)
Education and domestic services	3.9 (0.5)	11.6 (1.2)	4.8 (0.8)
Ceremonies	0.6 (0.1)	1.2 (0.3)	1.0 (0.2)
Tobacco / gambling	0.1 (0.1)	0.6 (0.3)	0.2 (0.1)

Entertainment / travel	11.6 (1.1)	12.8 (1.1)	15.1 (1.4)
Milling / processing	12.4 (0.8)	11.9 (1.0)	13.3 (0.9)
Other non-food	2.6 (0.4)	3.1 (0.4)	3.6 (0.5)

Note: 2-week expenditures are annualized by multiplying by 26, 1-month expenditures by 12, and 12-month expenditures are used as reported. Budget shares are category expenditure divided by total annual non-food expenditure. Shares are undefined for households with zero total non-food spending. Standard errors are robust and shown in parentheses. Means are calculated using household population weights.

Combining annualized food and non-food expenditures, total household spending on purchases averages approximately MWK 1.8 million for PAM workers, MWK 5.6 million for PAM outgrowers, and MWK 2.5 million for non-linked households (see Figure 2). The low expenditures for worker households are not explained by their smaller household size. They have both the lowest total and the lowest per capita annual household expenditure. Food expenditures account for roughly 50 percent, 30 percent, and 42 percent of total spending on purchases for workers, outgrowers, and non-linked households respectively. Including the market value of own food production raises these shares to 55 percent, 40 percent, and 53 percent.

The higher food share among PAM workers is consistent with lower overall household resources relative to outgrower and non-linked households. This is also reflected in high rates of subjective poverty (44%), moderate or severe food insecurity (79 %), and low asset ownership. They therefore represent a disadvantaged segment of the ZOI population. Non-PAM households are, however, a large and heterogeneous group with some worse-off than worker households.

Figure 2. Annualized total expenditures by household group

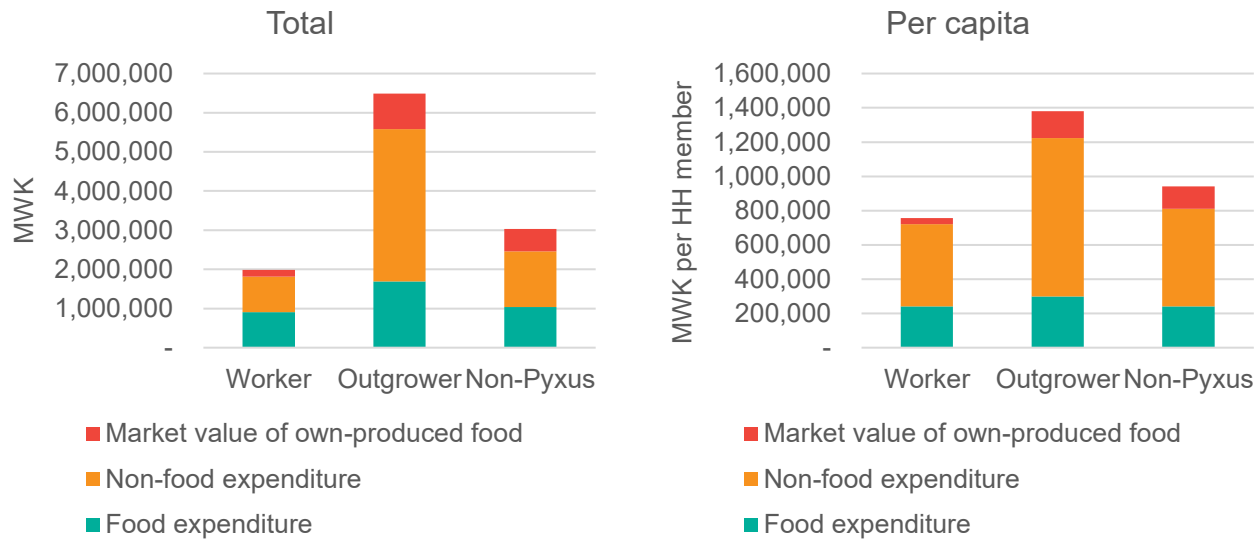


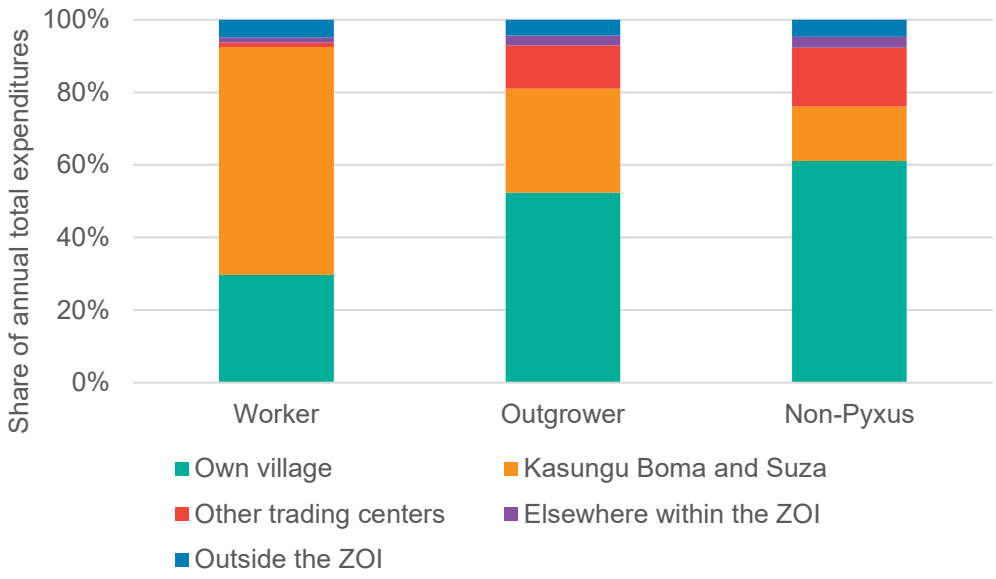
Figure 3 further disaggregates where within the ZOI households make these local purchases and illustrates the centrality of local spending for households.[8] Spending in households' own villages accounts for the largest share across all groups, rising from roughly one-third of total expenditures for PAM workers to more than one-half for outgrowers and around three-fifths for non-linked households. Purchases in the two main trading centers show clear differences by group: worker households rely heavily on the

[8] Own consumption of crops and livestock (including livestock byproducts) is included because, in LEWIE modeling and in agricultural household models more generally, rural households are both producers and consumers. Consumption from own production is treated as an implicit expenditure valued at market prices. This reflects the opportunity cost of production: households could sell these goods and use the proceeds to purchase food or other items. Including own consumption therefore ensures that total household demand is correctly measured and comparable across households that purchase food versus those that consume their own production.

nearby trading center of Suza, which is the second-largest spending destination for them. In contrast, outgrower households direct a larger share of their purchases to the larger market town of Kasungu Boma. Non-linked households show a more dispersed pattern, with relatively less reliance on either trading center.

Leakage shares range from 4.3 percent for outgrowers to 4.9 percent for worker households.

Figure 3. Expenditure shares by household group and location



Note: This figure represents the weighted mean shares of total annualized expenditure on purchases of food and non-food goods and services by location.

Business survey

Many households operate non-farm businesses and those are thus picked up by the household survey, which included a module on household non-farm enterprise activities. A complementary survey of 85 businesses operating in Kasungu Boma and three local trading centers (Gogode, Kaphaizi, Suza) was conducted to better characterize the non-farm sector of the ZOI. Businesses in Kasungu Boma, the largest trading center in the area, were sampled stratified by sector based on complete enumeration of commercial establishments conducted in May 2025 (IFPRI Malawi, 2026). In the other much smaller trading centers, a random walk strategy was employed.

Businesses were classified into three categories — retail (e.g. grocery and corner shops), services (e.g. repairs, transport, restaurants), and small-scale production (e.g. brickmaking, carpentry) — and surveyed on annual revenues, profits, labor inputs, and the sourcing and destination of purchases and sales. A key purpose of the business survey is to estimate the degree of local recirculation of income or how much of household spending on local goods and services is converted into wages, profits, and further local purchases, versus leaking to external suppliers.

Table 5 presents key characteristics of the businesses captured in the household and business survey. Businesses in the ZOI are predominantly small-scale. Average annual revenues range from MWK 25 to 66 million, and profits from MWK 5 to 14 million. A defining feature of the local business sector is the high reliance on inputs sourced from outside the ZOI — between 51 and 70 percent of intermediate inputs are purchased externally across the three business categories. This structural characteristic —

high external sourcing — represents the primary leakage mechanism in the non-farm sector and limits the extent to which household spending on local goods and services recirculates within the ZOI. Local businesses' direct sales to PAM are negligible across all business types (0–3 percent of revenues), confirming that local procurement by the anchor enterprise is not currently a meaningful channel for economic linkage.

Table 5. Business characteristics by sector

Variable	Business type		
	Retail (n=89)	Services (n=46)	Other production (n=23)
Annual revenue (MWK million)	66.4 (248.3)	32.0 (95.7)	25.4 (32.0)
Annual profits (MWK million)	14.1 (34.5)	5.0 (10.3)	9.8 (18.5)
Family labor days / year	258 (206)	256 (165)	286 (338)
Hired labor days / year	109 (409)	115 (193)	193 (287)
Intermediate inputs from outside ZOI (%)	69.5 (41.1)	67.0 (38.1)	50.9 (45.7)
Sales to local households (%)	71.0	76.0	55.0
Sales to other ZOI businesses (%)	15.0	12.0	19.0
Sales to PAM (%)	3.2 (1.8)	2.1 (1.4)	0.0 (0.0)

Note: Sales shares to local households and other ZOI businesses were reported by respondents only as approximate ranges; exact numeric percentages are not available in the survey data. Sales to PAM were reported numerically and are shown with mean and standard deviation.

PAM thus generates local economic activity primarily through the income channel — payments to outgrowers and workers that households then spend locally — rather than through direct supply-chain procurement. The flow diagram in Figure 1 becomes more concrete in the PAM context: PAM injects income via outgrower payments and wages (pathways a and b), which households spend in local retail and service markets (f), stimulating small businesses (c, d, e). However, high outside sourcing by businesses (g) limits the recirculation of income.

PAM administrative data

PAM provided administrative data on its 2025 payments for groundnut sales to contracted outgrowers organized in seven schemes in the ZOI and wages to workers of the Chilanga Farm and logistics and forest departments. After deducting the value of agricultural inputs provided on credit at the start of the 2024/25 agricultural season, PAM paid MWK 165 million to the local IPS outgrowers who supplied them with groundnuts in 2025.[9] Total wage expenditures amounted to MWK 458 million. These data were reconciled with household survey reports on receipts from PAM to ensure consistency between the two sources. The administrative totals represent the direct injections that anchor the LEWIE simulations.

In line with the results from the business survey, the scale of direct procurement from local businesses in 2025 is limited. It was estimated that PAM purchases less than MWK 17 million per year in goods and services from local firms (mostly construction materials and mechanical spares). This compares to

[9] The analysis only considers net payments to contracted outgrowers who sold groundnuts to PAM in 2025. Outstanding loans to outgrowers for whom no sales are recorded in 2025 are not taken into account. While the majority of the groundnut outgrowers also produce tobacco under contract for AOTM, this analysis considers only payments for groundnut sales to PAM.

MWK 623 million in payments to outgrowers and wages, meaning that the dominant transmission channel for local multiplier effects runs through household spending — not through direct supply-chain linkages between PAM and local enterprises.

Local Economy-Wide Impact Evaluation modeling approach

The LEWIE methodology constructs a micro-general equilibrium model of the ZOI, treating it as a small open economy in which tradable goods — groundnuts and other agricultural commodities that are bought and sold in regional and national markets — face externally determined prices, while non-tradable goods and services — local retail margins, repair services, small-scale construction — clear locally through price adjustment. This framework is well suited to the context, where outgrower payments and Chilanga workers' wages constitute discrete, externally determined injections whose local effects depend on the behavioral parameters of ZOI households and businesses.

Model structure and transmission channels

The LEWIE model for PAM incorporates the following core elements:

- Three household groups (outgrowers, workers, and non-PAM households), each characterized by distinct income sources and expenditure patterns;
- Six production activities: anchor crop (groundnut), other crops, livestock, retail and trade, services, and small-scale production;
- Three factors of production: family labor, hired labor, and capital and land (treated as activity-specific and fixed in the short run);
- External markets for all tradables and endogenous local markets for non-tradables; and
- Anchor-firm injections through outgrower payments and wage employment.

The model incorporates the pathways outlined in Section 2: direct earnings from PAM (paths a and b), income generation within local businesses (paths c and d), the allocation of business income to households (path e), and household spending feeding back into local production (path f). Leakages to outside markets (path g) enter through expenditure shares and intermediate input sourcing patterns.

Parameter estimation

Labor supply elasticities follow standard LEWIE practice for rural African contexts, with an upward-sloping labor supply curve (elasticity 0.5) allowing wages to respond modestly to increased labor demand. Standard errors and confidence intervals are obtained through 2,000 bootstrap replications clustered at the village level, ensuring that uncertainty reflects sample design and spatial correlation.

Behavioral parameters are estimated directly from the 2025 household and business surveys conducted in the PAM ZOI. Household expenditure functions for each group are derived using weighted least squares regressions of budget shares on the logarithm of total expenditure. These produce marginal propensities to consume (MPCs) across categories showing how households divide each additional kwacha they earn across different types of goods and services, and — crucially — how much is spent within the ZOI versus outside it. These MPCs govern how PAM's injections translate into local

demand. The estimated shares reflect the high degree of local spending in the ZOI, which supports the transmission of anchor enterprise income into broader community welfare.

Table 6 shows expenditure shares by household group. These are crucial for shaping local spillovers. High local marginal propensities to consume recycle income within the ZOI through pathway (f), amplifying indirect impacts on non-PAM households. Outside shares are low (3.2–5 %) across all groups, representing leakages that limit the multiplier process (pathway g)[10]. While all three groups overwhelmingly spend locally, there are notable differences in their expenditure shares. Worker households allocate the highest share of spending to local retail (51 %), reflecting both their smaller agricultural landholdings and higher cash incomes from Chilanga wages. Outgrower and non-PAM households allocate larger percentages to local agriculture (42 and 36 percent, respectively), consistent with the greater importance of own-production and local food markets in their consumption baskets.

Table 6. Household expenditure shares by household group and category

Category	Outgrower	Worker	Non-PAM
Outside ZOI	3.2 (0.5)	3.5 (0.5)	5.0 (0.7)
Local agriculture	41.8 (1.7)	22.1 (1.8)	35.9 (1.7)
Local retail	31.9 (1.4)	50.7 (1.6)	37.0 (1.3)
Local services	17.5 (0.9)	20.2 (0.9)	17.9 (0.9)
Local production	5.6 (0.4)	3.5 (0.3)	4.2 (0.3)

Note: Weighted mean shares of total annualized expenditure including the market value of own-produced food and robust standard errors in parentheses.

Production parameters are estimated using a cost-share approach in which intermediate inputs, hired labor, and value added are expressed as shares of gross revenue. For each activity, these shares determine how additional demand is converted into income and output, and how much leaks to external suppliers through intermediate purchases (Table 7). The crop at the center of the anchor enterprise arrangement, groundnut, exhibits a high value-added share of 83%, meaning most of the injection from outgrower payments translates directly into household income rather than purchases of inputs or expenditures on hired labor. Non-farm activities — retail, services, and small-scale production — have high intermediate input shares (63–74 percent of gross revenue) and a large portion of those intermediates (51–70%) is sourced from outside the ZOI.

Table 7

Table 7. Production parameters by activity

Activity	Intermediate input share (%)	Hired labor share (%)	Value-added share (%)
Anchor crop (groundnut)	13 (1)	4 (1)	83 (1)
Other crops	9 (2)	7 (2)	84 (3)
Livestock	12 (2)	2 (1)	86 (2)

[10] While shares in Figure 3 are based on location-of-purchase questions and use purchased expenditures only as the denominator, the shares in Table 6 use total expenditure including the market value of own-produced food, which is classified as inside the ZOI by definition. This difference in denominator explains the small discrepancy in outside-ZOI shares between the two (4.3–4.9% versus 3.2–5.0%).

Retail and trade	74 (6)	6 (2)	20 (4)
Services	63 (8)	12 (3)	25 (5)
Small-scale production	69 (7)	9 (3)	22 (4)

Note: Shares may not sum to exactly 100 due to rounding. Intermediate input share reflects expenditures on non-labor inputs as a percentage of gross revenue; value-added share includes returns to family labor, capital, and land.

Together, these parameter estimates underscore the dual character of the local economy around PAM's Chilanga Farm. Agricultural activities have high local value-added shares, meaning a larger portion of revenue is retained locally as household income (wages, profits, and family labor returns) rather than leaking out through imported intermediate inputs. In contrast, the non-farm sector, which transmits income through retail and service channels, is heavily dependent on external inputs, limiting the multipliers that otherwise would flow from high local spending propensities.

Technical details of the model equations are provided in the Technical Appendix.

General-equilibrium solution and price adjustment

Prices of non-tradable goods and services and wages transmit impacts through the local economy as they adjust to equate local supply and demand. Other things being equal, higher wages benefit workers while reducing farm and non-farm profits. Changes in prices of local non-tradable goods and services are costs for all households, especially those whose incomes do not rise substantially. The LEWIE model accounts for inflation by computing real income net of price effects.

Tradable goods do not experience price changes within the model because the ZOI is assumed too small to influence broader market prices. This assumption reflects conditions in rural Malawi, where markets for most agricultural commodities and goods sold in retail establishments are integrated into national supply chains, with prices effectively set externally.

Simulation design

Two classes of simulations are implemented:

- *Ex-post* simulations, which introduce observed 2025 injections into the calibrated model to estimate the total (direct plus indirect) economic effects of PAM's payments to outgrowers and workers in that year relative to a counterfactual in which PAM is absent.[11]
- *Ex-ante* simulations, which assess hypothetical changes — such as an expansion of outgrower payments or wages — to evaluate the potential economy-wide impacts of changes in PAM's operations or complementary interventions in the wider local economy.

Multipliers are calculated as the ratio of total real income generated to the size of the initial injection. A multiplier of, say, 1.5 tells us that each MWK of outgrower or wage payments creates an additional 0.5 kwacha of real income growth in the local economy, through its stimulus to local demand and production to satisfy this demand. Indirect effects are referred to as spillovers.

The model decomposes effects across household groups and sectors, showing how benefits accrue directly to recipients and indirectly to non-linked households and businesses. All structural equations

[11] In reality, the absence of PAM would not imply that outgrowers receive no income from groundnuts and workers have no income from employment – they may find substitutes, it is not possible to estimate the appropriate mix, and this simulation is hence an upper-bound estimate of PAM's impact.

follow the specifications documented in Taylor and Filipski (2014). Production functions are Constant Elasticity of Substitution (CES); household demand follows a linear expenditure system; and market-clearing conditions ensure that non-tradable prices adjust endogenously.

All confidence intervals are computed using a bootstrap procedure with 2,000 replications, stratified by household group and clustered at the village level to account for within-cluster correlation in survey responses. Bootstrap replications preserve the internal consistency of the SAM by re-estimating all parameters from bootstrap samples and re-solving the full GE system for each replication. Model code (Python), parameter files, and Stata do-files can be made available to analysts wishing to replicate or extend the analysis.

Results

As mentioned above, the LEWIE model is used to estimate both the realized impacts of PAM's 2025 operations (ex-post simulations) and the expected effects of hypothetical changes (ex-ante simulations) within the zone of influence. All results reported here are in real terms, meaning they incorporate the price adjustments that occur in non-tradable markets as increased demand puts upward pressure on local prices and wages.

Multipliers are calculated as the cumulative sum of direct, indirect, and induced effects across successive rounds of local transactions until leakages cause convergence. These are expressed in real, or price-adjusted, terms. Employment effects are reported in labor days, reflecting seasonal and part-time labor patterns. Employment days are derived by converting the additional labor value generated — using a hired-labor share applied to induced output — into labor days at a rural daily wage of MWK 5,000.[12] Employment figures refer to additional hired-labor days induced through multiplier effects in local businesses and farms, on top of direct employment by PAM at Chilanga.

Ex-post simulation

The ex-post simulation asks: what is the total real income in the ZOI that is attributable to PAM’s actual 2025 operations in the area around its Chilanga Farm? Based on the simulation, we estimate that the MWK 623 million in payments by PAM added MWK 1,152 million (95% CI: MWK 1,090–1,214 million) to the local economy. This implies a real income multiplier of 1.85; that is, each MWK of local spending by the firm created MWK 1.85 of price-adjusted income increases to local households, which includes 0.85 of local income spillovers. Table 8 reports the full set of ex-post results.

Local non-farm sectors play an important role in transmitting these effects. Roughly 27 percent of total benefits arise in non-farm (retail and service) sectors, which depend heavily on household spending. These activities amplify income effects despite their relatively high intermediate input shares, which limit how much spending remains within the ZOI. Because price effects are moderate relative to income growth, the real multipliers remain substantial even after adjusting for changes in the cost of living.

The real income multiplier of 1.85 implies that the secondary circulation of income through local markets — the rounds of spending by workers at local shops, by shopkeepers at local suppliers, and so on — generates MWK 0.85 in additional local income or value-added for every MWK 1 of PAM’s direct

[12] The daily wage of MWK 5,000 used to convert induced labor value into labor days is the median reported ganyu (casual labor) wage from the household survey. While the mean ganyu wage is higher and current casual rates in the area can reach up to MWK 15,000, the median provides a conservative and standard benchmark for valuing additional hired labor days. PAM pays the legal minimum wage for regular long-term employment, which is lower than peak casual rates but offers greater job stability.

payment. This secondary effect amounts to MWK 529 million (95% CI: 476–582 million), which approaches the scale of the entire PAM injection itself.

Outgrower households received approximately MWK 289 million in total real income (their direct payments of MWK 165 million plus MWK 124 million in spillovers). Worker households received approximately MWK 471 million, retaining the large majority of their MWK 458 million wage injection in real terms after modest local price increases, but capturing very little of the additional spillover income. Of this additional real income, nearly three-quarters (74 %) or MWK 392 million flows to non-PAM households. These households do not receive any payments from PAM directly, but they nonetheless benefit indirectly from the enterprise's presence, through local market linkages. When taking into account the total real-income increase of 1,152 million, including the initial payments by PAM, non-PAM households receive 34 percent.

The model estimates a total indirect employment effect of approximately 6,780 labor days (95% CI: 6,350–7,750), distributed across agricultural production, retail, services, and other local activities. Outgrower households capture the largest share of employment increases (4,710 days), followed by non-PAM households (1,280 days) and workers (790 days), reflecting the structure of local demand and production linkages. Converting to full-time equivalents at a 250-day working year yields approximately 27 person-years of indirect employment.

Table 8. Ex-post impacts of PAM's 2025 operations

Impact category	Estimate	95% CI	Outgrower	Worker	Non-PAM
Total real income (MWK million)	1,152	[1,090, 1,214]	289	471	392
Real income multiplier	1.85	[1.75, 1.95]	0.46	0.76	0.63
Total real spillover income (MWK million)	529	[476, 582]	124	13	392
Total real spillover income per HH (MWK)	13,351	[12,012, 14,690]	510,288	30,660	10,062
Total real spillover income per HH (% of baseline annual exp.)	—	—	9.1	1.7	0.4
Total employment (days)	6,780	[6,350, 7,750]	4,710	790	1,280
Total employment per HH (days)	0.17	[0.16, 0.20]	19.38	1.86	0.03
Non-farm share of additional real income (%)	27	[24, 30]	—	—	—
Non-tradable price change (%)	7.4	[6.9, 7.9]	—	—	—
Wage change (%)	4.6	[4.2, 5.0]	—	—	—

Note: Confidence intervals are based on 2,000 clustered bootstrap replications.

While non-PAM households capture most of the economic spillovers, they also constitute the largest group of households. Each of the approximately 38,960 non-PAM households on average receives MWK 10,062 in real income (0.4 percent of their baseline annual expenditure) and 0.03 labor days of employment as a result of PAM payments to outgrowers and workers. In practice, these benefits are likely to be concentrated among owners of local businesses and households providing labor, respectively. In contrast, outgrowers make up a very small proportion of the local economy's population. Yet, they still capture around a quarter of the spillover effects, resulting in much larger per household indirect impacts.

To examine the distribution of benefits across the income spectrum, we conducted a micro-simulation linking model results with the raw survey data. More specifically, the real spillover income generated by

PAM operations (MWK 529 million) is allocated across the five expenditure quintiles of the ZOI population using micro-simulation. Gains are distributed in proportion to each household's baseline share of factor incomes (primarily wages/ganyu, family labor returns, and profits) from the survey data.

Table 9. Distribution of spillover income by expenditure quintile

Expenditure quintile	Share of secondary spillover (%)	Amount (MWK million)
Q1 (poorest)	16.5	87.3
Q2	17.2	91.0
Q3	18.0	95.2
Q4	20.8	110.0
Q5 (richest)	27.5	145.5
Total	**100.0**	**529.0**

The results show that 16.5 percent of the economic spillover generated by PAM's operations accrue to the poorest 20 percent of households in the area around Chilanga Farm. The bottom two expenditure quintiles (Q1 and Q2) together, which include many non-PAM households, capture 33.7 percent of the secondary spillover (MWK 178 million). This demonstrates that poorer households in the wider community benefit meaningfully from PAM's operations through indirect market linkages, even though they are largely excluded from direct outgrower contracts. This mainly reflects the importance of the hired-labor channel: poorer households participate disproportionately in *ganyu* and other casual wage work activated by the multiplier circuit.

Ex-ante simulations

To provide further insights, this section presents the results of five ex-ante simulations of hypothetical scenarios co-developed during a stakeholder workshop modelled on top of the 2025 baseline injection. Because the direct injection differs in size and channel across scenarios, results are presented as direct injection alongside total income gain, making the local income effect of each scenario directly legible without requiring a common multiplier ratio.

Input-cost reduction through a seed-multiplication package

At present, the costliest component of the input package that PAM provides to its groundnut outgrowers on credit is certified seed, supplied at a rate of 140 kg per hectare and multiplied on the company's own farms, including Chilanga. PAM is considering altering this model by providing a selection of more established outgrowers with a "nursery" package of 20 kg of seed that these farmers would multiply themselves for sowing the following season, rather than receiving the full quantity of company-produced certified seed each year. Even after accounting for the additional inputs needed to ensure good-quality multiplication, this could reduce the cost of the input package from approximately USD 300 to USD 113 per hectare while productivity is assumed to remain unaffected. First and second-year outgrowers, who account for around half of the outgrowers in the study area in 2025, would be excluded from the arrangement. As the outgrower network matures, PAM aims to provide the nursery package to 85 percent of its outgrowers.

Because the cost of seed and other inputs supplied on credit is deducted from the value of outgrowers' groundnut sales before payment, lowering the cost of the package raises the net payment that outgrowers retain. This scenario is therefore operationalized as a 62 percent reduction in per-hectare input costs for 50 percent of outgrowers. The resulting cost saving is modeled as a net increase of over MWK 63 million in effective outgrower payments — a marginal demand-side shock to the anchor crop activity.

Table 10. Marginal impacts of nursery package

Impact category	Estimate	95% CI	Outgrower	Worker	Non-PAM
Direct injection to outgrowers (MWK million)	63.6	—	63.6	0.0	0.0
Total additional real income (MWK million)	117.6	[111.3, 123.9]	71.0	5.7	40.9
Total additional real spillover income (MWK million)	54.1	[51.2, 57.0]	32.7	2.6	18.8
Total additional employment (days)	755	[715, 795]	457	37	261
Non-farm spillover share (%)	27	[24, 30]	N/A	N/A	N/A

Note: Results are from a marginal simulation on top of the 2025 baseline injection. Confidence intervals are based on 2,000 bootstrap replications. The direct injection is the implied income gain to outgrower households from lower seed input costs.

The results suggest that the introduction of the nursery package allowing a subset of farmers to multiply their own groundnut seed and associated reduction in input costs would generate close to MWK 118 million in total real income across the ZOI (95% CI: 111.3–123.9 million) — around MWK 54 million more than the direct income gain of over MWK 63 million for outgrower households. MWK 19 million or 35 percent of the spillover income generated by the reduction in input costs accrues to non-PAM households. It would create approximately 755 additional labor days, mostly for outgrower households (60 %).

Wage premium above the minimum wage

PAM's wage policy for general workers, who make up around 95 percent of the workforce at Chilanga, has been to pay the government-mandated minimum wage. The company may consider raising wages and potentially specify a premium above the minimum wage.

In a second scenario, we therefore model the local economic impacts of a 25 percent increase in PAM's wage payments, resulting in an additional injection of MWK 114 million distributed across Chilanga Farm and Forest workers. In the baseline LEWIE model the local hired-labor wage is endogenous. This simulation models the wage increase as applying only to PAM workers, implicitly creating a two-tier labor market: PAM workers receive the higher wage, while the rest of the local labor market clears at the endogenous wage.

Table 11. Marginal impacts of 25 percent wage increase

Impact category	Estimate	95% CI	Outgrower	Worker	Non-PAM
Direct wage injection to workers (MWK million)	114.4	—	0.0	114.4	0.0
Total real income gain (MWK million)	193.3	[183.1, 203.5]	4.6	93.0	95.7
Total real spillover income (MWK million)	78.9	[74.7, 83.1]	1.9	38.0	39.0
Total additional employment (days)	520	[492, 548]	12	210	298

Non-farm spillover share (%)	27	[24, 30]	N/A	N/A	N/A

Note: Results are from a marginal simulation on top of the 2025 baseline injection. Confidence intervals are based on 2,000 bootstrap replications.

These results show that a 25 percent wage increase would generate MWK 193 million in total real income (95% CI: 183.1–203.5 million) — MWK 79 million more than the direct wage injection. Wage payments thus generate less income per kwacha of direct injection than outgrower payments (1.69 compared to 1.85) mainly because workers spend a larger share of their income at retail outlets, which results in higher leakage outside the ZOI. At the same time, the spillover income generated through the wage channel is distributed more broadly across households in the ZOI. Workers' local spending circulates through the non-farm economy and reaches households with no direct link to PAM. Non-PAM households capture nearly half (49 %) of the spillover income generated by the wage channel. This is lower than the overall ex-post spillover share of 74 percent because the wage injection recirculates differently from outgrower payments — workers spend a larger share at retail outlets that have higher external leakage, producing a smaller local multiplier loop than outgrower spending.

Workforce meal program

PAM is currently rolling out a workforce meal program under which lunch is prepared and served to workers on-site at Chilanga Farm. Once fully developed and implemented throughout the year, this would involve an annual purchase of at least 10 tons of maize and 2.5 tons of beans. At 2025/26 government minimum farmgate prices (MoA, 2026), these purchases amount to an additional expenditure of MWK 15 million. Where possible, PAM would source this food entirely from local farmers through organizing buying days at Chilanga Farm.

Unlike the outgrower and wage channels, this procurement thus draws on the broader ZOI farming community, including non-linked households that grow these staple crops. This is modeled as a marginal demand-side shock to all non-anchor crop activity.

Table 12. Marginal impacts of workforce meal program with local sourcing of maize and beans

Impact category	Estimate	95% CI	Outgrower HHs	Worker HHs	Non-PAM HHs
Direct procurement injection (MWK million)	15.2	—	—	—	—
Total real income gain (MWK million)	28.2	[26.7, 29.7]	17.1	1.2	9.9
Total real spillover income (MWK million)	13.0	[12.3, 13.7]	7.9	0.6	4.5
Total additional employment (days)	185	[175, 195]	112	8	65
Non-farm spillover share (%)	27	[24, 30]	N/A	N/A	N/A

Note: Results are from a marginal simulation on top of the 2025 baseline injection. Confidence intervals are based on 2,000 bootstrap replications. The direct procurement injection flows to local food-supplying households (outgrowers and non-PAM farmers); exact per-group breakdown is not separately available.

Locally sourcing the produce required for lunch at Chilanga Farm would generate MWK 28 million in total real income across the ZOI (95% CI: 26.7–29.7 million) — MWK 13 million more than the direct procurement injection of over MWK 15 million to local food suppliers.

Both the nursery package and the workforce meal program operate through agricultural channels and generate virtually the same ratio of total additional real income to direct injection (approximately 1.85), reflecting similar local spending patterns and leakage rates.

An economy-wide capital injection

Beyond changes to PAM's own operations and local expenditures, we also consider complementary interventions that relax the capital constraints facing local households and businesses. In its original conception, the Growth Poles Project included such a component through capital injections to Village Savings and Loan Associations (VSLA) in the vicinity of the partner enterprises. This scenario models a 10 percent exogenous increase in capital income (profits and family labor returns) distributed proportionally across all household groups in the ZOI, reflecting improved access to credit and productive capital.

Table 13. Marginal impacts of a 10 percent capital injection

Impact category	Estimate	95% CI	Outgrower HHs	Worker HHs	Non-PAM HHs
Direct capital income injection (MWK million)	86.0	—	—	—	—
Total real income gain (MWK million)	145.0	[137.2, 152.8]	7.0	4.5	133.5
Total real spillover income (MWK million)	59.0	[55.8, 62.2]	2.8	1.8	54.4
Total additional employment (days)	410	[388, 432]	20	13	377
Non-farm spillover share (%)	32	[29, 35]	N/A	N/A	N/A

Note: Results are from a marginal simulation on top of the 2025 baseline injection. Confidence intervals are based on 2,000 bootstrap replications. The direct capital injection is distributed across all groups in proportion to capital holdings; non-PAM households hold the majority of ZOI non-farm capital.

A 10 percent capital injection of MWK 86 million would generate MWK 145 million in total real income (95% CI: 137.2–152.8 million) — MWK 59 million more than the direct injection — of which MWK 54 million (92%) accrues to non-PAM households who hold the majority of the non-farm assets or capital in the ZOI. It would create approximately 410 additional labor days.

The capital injection generates less total real income per MWK injected (1.69) than the scenarios operating through agricultural channels. This is because capital income accrues predominantly to non-PAM households, which have higher expenditure leakage outside the ZOI — they allocate a larger share of their income to traded or district-sourced goods and services rather than locally produced ones. The channel's distinctive advantage is inclusivity: it directs the largest share of both direct and spillover gains to non-PAM households of any of the five simulations.

A productivity increase among local businesses

Finally, we model a stylized 10 percent increase in productivity among local non-tradable businesses, such as retail and service enterprises. In practice, such gains might come from investments in market or transport infrastructure, support for upgrading processing equipment such as maize mills, or business- and financial-management training.

Such complementary interventions can reduce inflationary pressure from income injections, increasing the real purchasing power of each kwacha of PAM's spending.

Because we do not know the cost of achieving this productivity growth, we do not report a cost-efficiency ratio for the productivity shock itself. Instead, Table 14 shows the total real income generated by

PAM's spending under both the baseline and with-productivity scenarios, alongside the associated price and employment effects, to highlight the inflation-mitigating effects.

Table 14. Total multiplier effects of PAM's 2025 operations with and without 10 percent productivity increase in non-tradables sector

Scenario	Income multiplier (95% CI)	Total income increase (MWK million)	Non-tradable price rise (%)	Employment (days)
2025 baseline injection	1.85 (1.75–1.95)	1,152	7.4	6,780
2025 baseline injection + 10% non-tradable productivity increase	2.04 (1.93–2.15)	1,270	4.3	7,520

The combined effect of PAM's cash spending and a 10 percent productivity increase in non-tradable sectors raises the multiplier to 2.04, resulting in a total real income of MWK 1,270 million. Non-tradable price inflation falls sharply from 7.4 percent to 4.3 percent — a reduction of more than three percentage points — because the productivity improvement in supply keeps pace with the demand stimulus. Employment rises from 6,780 to 7,520 labor days, reflecting the additional economic activity supported when price pressures are contained. This result illustrates the complementarity between demand-side (income injection) and supply-side (productivity) interventions: productivity gains both amplify and stabilize local economic impacts.

These productivity simulations are illustrative rather than evidential: they quantify the income and inflation consequences that would follow from a given productivity improvement, not whether that improvement has been or can be achieved. They nonetheless carry a clear policy implication. The inflation-mitigation pathway is particularly important in a context like rural Malawi, where non-tradable prices respond sensitively to demand shocks. Interventions that raise the productivity of local retail, processing, and services alongside anchor-firm spending would substantially increase the real-income growth captured by all ZOI households, not only those directly linked to PAM.

Sensitivity analysis

Most parameters in the LEWIE model are estimated directly from the 2025 household and business surveys and PAM administrative records — expenditure shares, production cost structures, income sources, and local spending patterns all come from the data. Three key parameters, however, cannot be reliably estimated from a single cross-sectional survey and must be set by judgment: the ZOI boundary (which determines the leakage rate), the elasticity of labor supply, and the tradable/non-tradable classification of activities. Estimating how labor supply responds to wage changes requires observing the same people across multiple time periods with varying wages — our cross-sectional survey captures a single snapshot and cannot identify this response. The tradable/non-tradable classification similarly requires a judgment call: non-farm services are locally supplied almost by definition, since workers cannot commute long distances on Malawi's road network, but agricultural goods can go either way depending on how connected local markets are to regional price-setting. Rather than treat these chosen values as certainties, we test whether the results are sensitive to reasonable alternatives.

To assess the robustness of the results, we examine sensitivity to two core modeling assumptions that influence how local prices, wages, and real income respond to the PAM injections: the labor supply elasticity and the tradable/non-tradable classification of activities.

In the baseline model, labor supply follows an upward-sloping curve with an elasticity of 0.5, consistent with standard LEWIE applications in rural African contexts. Agricultural activities (anchor crop, other crops, and livestock) are treated as tradable, with prices fixed externally, while non-farm activities (retail, services, and small-scale production) are treated as non-tradable, with prices clearing locally. This structure reflects conditions in the ZOI, where agricultural goods — groundnuts in particular — routinely flow to national and export markets, while most non-farm goods and services are supplied and consumed locally. In the case of local shops, much of the merchandise on the shelves comes from other parts of the country, so its wholesale price is set outside the local economy. What varies locally is the retail mark-up — the margin that covers the shopkeeper's hired labor, premises, and profit. It is this margin, not the merchandise itself, that the model treats as non-tradable, and it is captured in the relatively small value-added share for retail reported in Table 7. Local competition and demand conditions determine how large that margin can be, and it is this locally determined component that responds to income injections from PAM.

Alternative assumptions

Two alternative labor supply elasticities to the 0.5 elasticity used in the LEWIE model are considered. A lower elasticity of 0.3 reflects structural constraints on labor supply responses — such as seasonal labor patterns, limited mobility, or high reservation wages when workers have good competing employment options — while a higher elasticity of 0.7 represents greater responsiveness through migration, increased hours worked, or labor-force entry from the pool of underemployed workers common in rural Malawi.

In addition, we examine an alternative market structure in which all activities are treated as non-tradable, implying that prices for agricultural as well as non-farm goods clear locally rather than through regional markets. In practice, the tradable assumption is well grounded for the PAM ZOI: the prices PAM pays outgrowers for groundnuts are linked to national and international markets, maize prices are shaped by the Government of Malawi's longstanding price support and input subsidy policies, and local markets in Kasungu are routinely supplied with fresh produce from other parts of the country. These features mean that local supply and demand conditions in the ZOI have little influence on agricultural prices — they are effectively set from outside. Nevertheless, the degree of market integration can vary across crops and seasons, so we test whether treating all activities as non-tradable materially changes the results.

For each variant, we re-run the outgrower and wage simulations and compare real income multipliers, price responses, and wage effects to the baseline. The results appear in Table 15.

Table 15. Sensitivity of real income multipliers to key assumptions

Assumption variant	Outgrower multiplier (95% CI)	Wage multiplier (95% CI)	Change in non-tradable prices	Change in local wages
Base case (labor elasticity = 0.5; ag tradable)	1.85 [1.75–1.95]	1.69 [1.60–1.78]	+7.4%	+4.6%
Labor elasticity = 0.3	1.83 [1.73–1.93]	1.65 [1.56–1.74]	+8.9%	+5.3%
Labor elasticity = 0.7	1.94 [1.84–2.04]	1.76 [1.67–1.85]	+7.4%	+4.0%
Base case with all activities non-tradable	1.62 [1.52–1.72]	1.47 [1.37–1.57]	+31%	+14%

The results show that the main findings are robust to reasonable variation in labor supply elasticity. Changing the elasticity from 0.5 to 0.3 or 0.7 alters real income multipliers by between 0.02 and 0.09 points, with corresponding but modest changes in wage and price pressures. These differences are small relative to the overall magnitude of the estimated impacts and fall well within the confidence intervals of the baseline estimates.

In contrast, treating all activities as non-tradable produces substantially larger price responses and lower real income multipliers. Under this assumption, non-tradable prices increase by approximately 31 percent and local wages by about 14 percent, eroding real income increases despite higher nominal output. This outcome reflects binding local supply constraints when agricultural goods are assumed to clear only within the ZOI. It underlines the importance of well-integrated food markets in a country like Malawi.

For the PAM context, we believe the baseline tradable/non-tradable classification is more appropriate. Groundnuts and other crops produced in the ZOI are integrated into national and international markets through PAM's own export and processing operations in Lilongwe, while retail and service activities remain locally supplied. The sensitivity analysis clarifies why assuming all activities to be non-tradable would understate real income increases in a connected rural economy and reinforces the plausibility of the baseline modeling assumptions.

Conclusions and policy implications

In addition to processing groundnuts, operating its own large farms, and running a sizeable forestry operation, PAM, one of the Growth Poles Project's partners, acts as an anchor enterprise by sourcing groundnuts from a large network of smallholder farmers across the northern and central regions of Malawi, providing them with improved seed and other inputs on credit, extension services, and a guaranteed market. This study set out to measure how PAM's operations in and around its Chilanga Farm in Kasungu affect the wider local economy, and whether the benefits reach beyond the farmers and workers the enterprise engages directly.

Using a micro-general equilibrium model (LEWIE), calibrated using detailed 2025 household and business survey data together with firm administrative records, we estimate that PAM's MWK 165 million in payments to contracted IPS outgrowers for groundnut sales and MWK 458 million in wages to workers generated MWK 1,152 million in real household income across the ZOI, corresponding to a real multiplier of 1.85. In other words, for every kwacha PAM spent locally, a further MWK 0.85 of real income is created as that spending circulated through local markets, after adjusting for modest increases in local prices and wages.

Households without direct contractual or employment links to PAM — who include many of the poorest in the ZOI — capture nearly three-quarters of these indirect spillovers, transmitted primarily via local retail and service markets. The magnitude of these effects should, however, not be overstated. Average per-household indirect gains are modest as they are spread over a large group of non-linked households. Roughly one third of these secondary gains reach households in the poorest two quintiles. In a setting where only a limited number of households can participate in anchor enterprise schemes directly, and the poorest least of all, this indirect channel is the main route through which an anchor enterprise impacts the broader community.

The outgrower channel generates more total income per kwacha of direct injection but less broadly distributed benefits than wage employment. A reduction in input costs resulting in higher net payments to

outgrowers, for example, generates close to MWK 118 million in total income from a direct gain of over MWK 63 million, with non-PAM households capturing 35 percent of the associated spillover income; a 25 percent wage premium generates MWK 193 million in total income from MWK 114 million direct, with 49 percent of gains accruing to non-PAM households. Strategies that increase the value of groundnut payments — through higher farm-gate prices, expanded contracting, improved productivity, or better-quality premia — would appear to be able to generate the largest economy-wide income per kwacha of direct injection. Nevertheless, wage employment at Chilanga generates substantial benefits for worker households, which as a group have the worst living conditions and the highest rates of subjective poverty and food insecurity. Both channels generate meaningful local income well above the amounts directly injected.

The primary constraint on local income amplification is leakage through non-farm intermediate inputs. While households are overwhelmingly locally oriented in their spending, local non-farm businesses primarily source their intermediate inputs from suppliers outside the ZOI, thereby limiting total income generated per kwacha of injection. The results also show that PAM's current operations raise non-tradable prices by approximately 7.4 percent and local wages by 4.6 percent. While these are moderate effects, suggesting that current operations are not generating severe inflationary pressure in the ZOI, additional simulations illustrate that increasing productivity in non-tradable sectors substantially dampens price pressures while modestly increasing real income and employment effects.

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Technical Appendix: The PAM LEWIE Model

The LEWIE model for the PAM ZOI follows the micro-general equilibrium framework set out in Taylor and Filipski (2014), adapted to PAM ZOI conditions based on 2025 survey data and firm records. This appendix provides a summary of model structure, equations, calibration procedures, and validation checks.

Model Overview

The model represents the PAM ZOI as a small open economy with the following agents and activities:

- Three household groups: outgrowers, workers, and non-PAM households;
- Six production activities: anchor crop (groundnut), other crops, livestock, retail and trade, services, and small-scale production;
- Three factors of production: family labor, hired labor, and capital and land (treated as activity-specific and fixed in the short run);
- External markets for all tradables; endogenous local markets for non-tradables.

Production

All production activities use a Constant Elasticity of Substitution (CES) value-added function with fixed intermediate input shares derived from survey data. For activity a:

$$Q_a = A_a(\delta_L {L_a}^{\rho} + \delta_K {K_a}^{\rho})^{\frac{1}{\rho}}$$

Intermediate input, labor, and value-added shares correspond to the cost shares summarized in Table 7. For non-farm activities, intermediate input shares are relatively high (63–74 %), reflecting dependence on imported goods and external suppliers, while agricultural activities exhibit high value-added shares (83–86 %).

Household Income

Households receive income from family labor, wages, profits distributed from activities, transfers, and — when applicable — PAM injections. Income for household group h is given by:

$$Y_h = wL_h + \pi_h + T_h + Shock_h$$

where $Shock_h$ represents outgrower payments or wage earnings associated with PAM's operations.

Household Demand

A Linear Expenditure System (LES) governs household consumption, calibrated using marginal budget shares estimated from survey data (Table 6). For household h and good g:

$$C_{h,g} = \gamma_g + \beta_g \left(\frac{Y_h - \sum_p \gamma_p P_p}{P_g} \right)$$

where γ_g *denotes subsistence levels and* βg denotes marginal budget shares. Goods are allocated across inside-ZOI and outside-ZOI sources using estimated expenditure shares.

Market Clearing for Non-Tradables

For each non-tradable good g:

$$Q_g = \sum_h \left(C_{h,g} + Intermediate\ Demand_g + Anchor - Firm\ Demand_g \right)$$

Prices P_g adjust to clear these markets, while tradable prices remain fixed. The consumer price index for tradables serves as the numéraire.

Calibration and Parameter Estimation

All structural parameters are estimated directly from the 2025 PAM ZOI surveys and anchor-firm administrative data.

Household weights for the PAM Zone of Influence (ZOI) were constructed using a post-stratification approach that integrates 2025 household survey data, PAM administrative records, and 2018 Malawi Population Census data. Because the ZOI does not correspond to a formal administrative boundary, census totals were assembled for the relevant Traditional Authorities and Sub-Traditional Authorities (STA Mphomwa, TA Kaomba, TA Wimbe, TA Mwase, TA Kaphaizi, STA Mangwazu, and STA Mawawa), with 50 percent of TA Wimbe households included to reflect partial geographic overlap with the effective ZOI. Three household groups were defined (worker, PAM outgrower, and PAM non-linked households), with administrative firm data used to set population targets for linked groups and residual census totals used to determine targets for non-linked households. Base weights were computed as the ratio of each group's population target to its sample size. Because the survey design intentionally oversampled trading centres and communities near Chilanga, additional post-stratification adjustments were applied to non-linked households to align their geographic distribution with census shares. The resulting weights ensure that total weighted households match census-based population estimates for the PAM ZOI, linked groups match firm records, and the spatial distribution of non-linked households reflects underlying population shares despite intentional oversampling. The final weighted population shares used in this analysis are: Outgrower 0.0061, Worker 0.0107, and Non-linked 0.9832 — indicating that non-linked households constitute approximately 98.3 percent of the weighted ZOI population. All model parameters (expenditure shares, production parameters, income sources) were re-estimated using these final weights.

Household expenditure data are used to estimate budget shares via weighted ordinary least squares regressions of expenditure shares on the logarithm of total expenditure. These provide: marginal propensities to consume by category; location-specific expenditure shares (inside versus outside the ZOI); and subsistence parameters for the LES.

Production cost shares are estimated using a revenue-based cost-share approach. For each activity: intermediate input share = intermediate expenditures divided by gross revenue; hired labor share = wage payments divided by gross revenue; value-added share = residual. These parameters supply the model's behavioral response to demand changes and determine how injections translate into income and output across activities.

Labor Supply

An upward-sloping rural labor supply curve with elasticity 0.5 is used, consistent with LEWIE implementations in similar contexts. This allows wages to respond modestly to demand increases.

Standard Errors and Uncertainty

All estimates incorporate 2,000 clustered bootstrap replications, with villages serving as the clustering unit. This approach captures sampling variability and spatial correlation in the data and produces the 95 percent confidence intervals reported in the main text.

Model Closure

The model uses a standard short-run closure appropriate for rural African settings. Tradable goods prices are fixed externally (small open economy assumption). Non-tradable prices adjust to clear local markets. Labor supply is upward-sloping and wages are endogenous. Capital and land are activity-specific and fixed. The consumer price index of tradable goods serves as the numéraire. This closure allows the model to capture price effects in non-tradable sectors while keeping the tradable sector insulated from local shocks.

Validation and Consistency Checks

The model underwent several internal validation checks before producing final results:

1. Social Accounting Matrix (SAM) consistency: SAM balances close to within 0.01 percent, indicating internal coherence.
2. Replication of observed macro aggregates: The model reproduces ZOI household income shares, production levels, and labor allocations consistent with survey estimates, within sampling error.
3. Sensitivity to removal of PAM injections: Setting outgrower payments and PAM wages to zero reduces simulated ZOI GDP by approximately 38 percent, a magnitude consistent with the scale of PAM's injections and the multipliers estimated.
4. Stability under Monte Carlo replications: Confidence intervals remain stable across iterations, suggesting robust parameterization.

These checks do not prove external validity but confirm that the model reproduces core structural patterns contained in the underlying data.

Parameter Files and Replication Materials

The full model implementation includes: Python code (pyxus*lewie.py, adapted from tropha*lewie.py); an Excel parameter workbook (Pyxus*LEWIE*Parameters.xlsx); Stata do-files for parameter estimation and bootstrapping; and survey instruments and cleaning scripts. These materials can be provided to analysts wishing to replicate the results or extend the framework to alternative scenarios or additional growth poles.

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